Lake habitat preferences of juvenile chinook salmon in controlled experimental arenas

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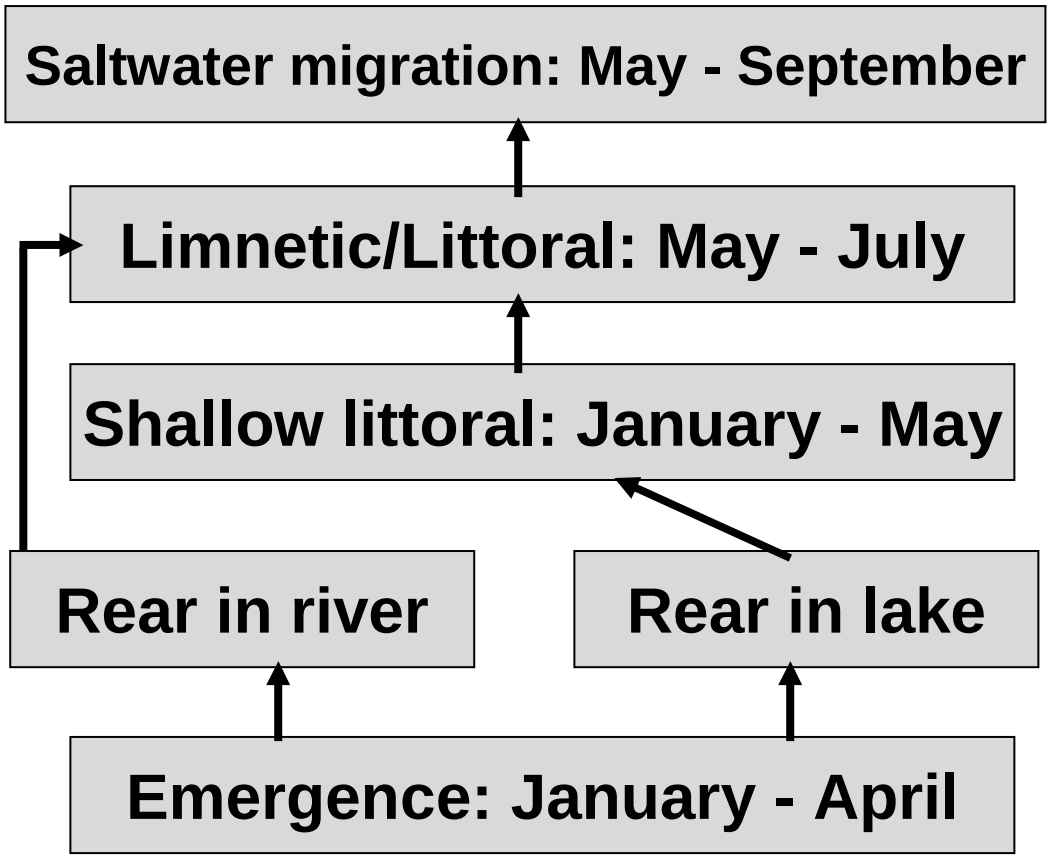
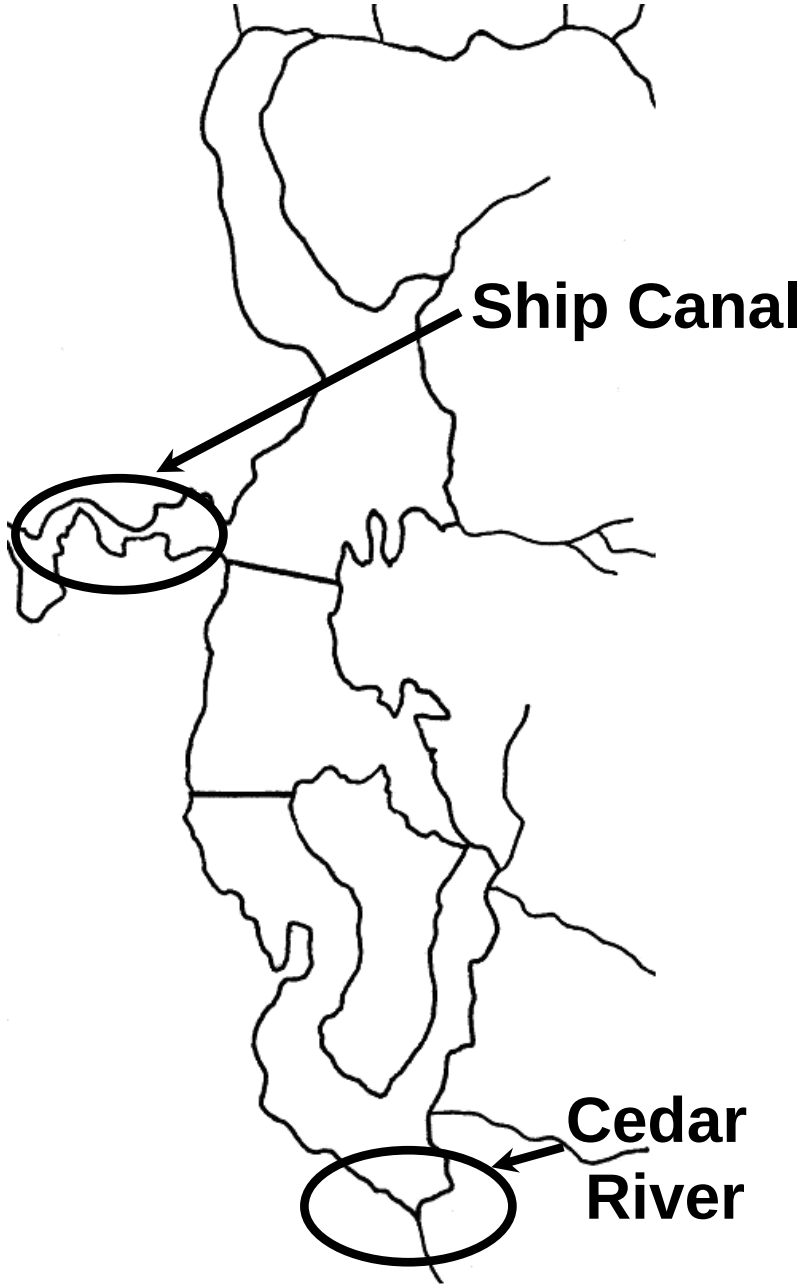
Study funded by:

Seattle Public Utilities

Juvenile chinook salmon in Lake Washington

2 observed rearing strategies





Field observations on lake-rearing chinook

Temporal movement

- Littoral: January to Mid-May
- Limnetic: Mid-May to July

Observed habitat use

- Low bottom slope
- Sand, gravel substrate
- Shallow water < 0.4 m

2003 pilot study objectives

- **Baseline habitat preferences**
  - **Substrate: Cobble, Sand**
  - **Bottom slope: 5% to 20%**
- **How does piscivore presence affect habitat preference?**
- **Is a large arena feasible?**

The Arena

2003 pilot experiments - Seward Park

Average fish size: 73 mm, 3.72 g

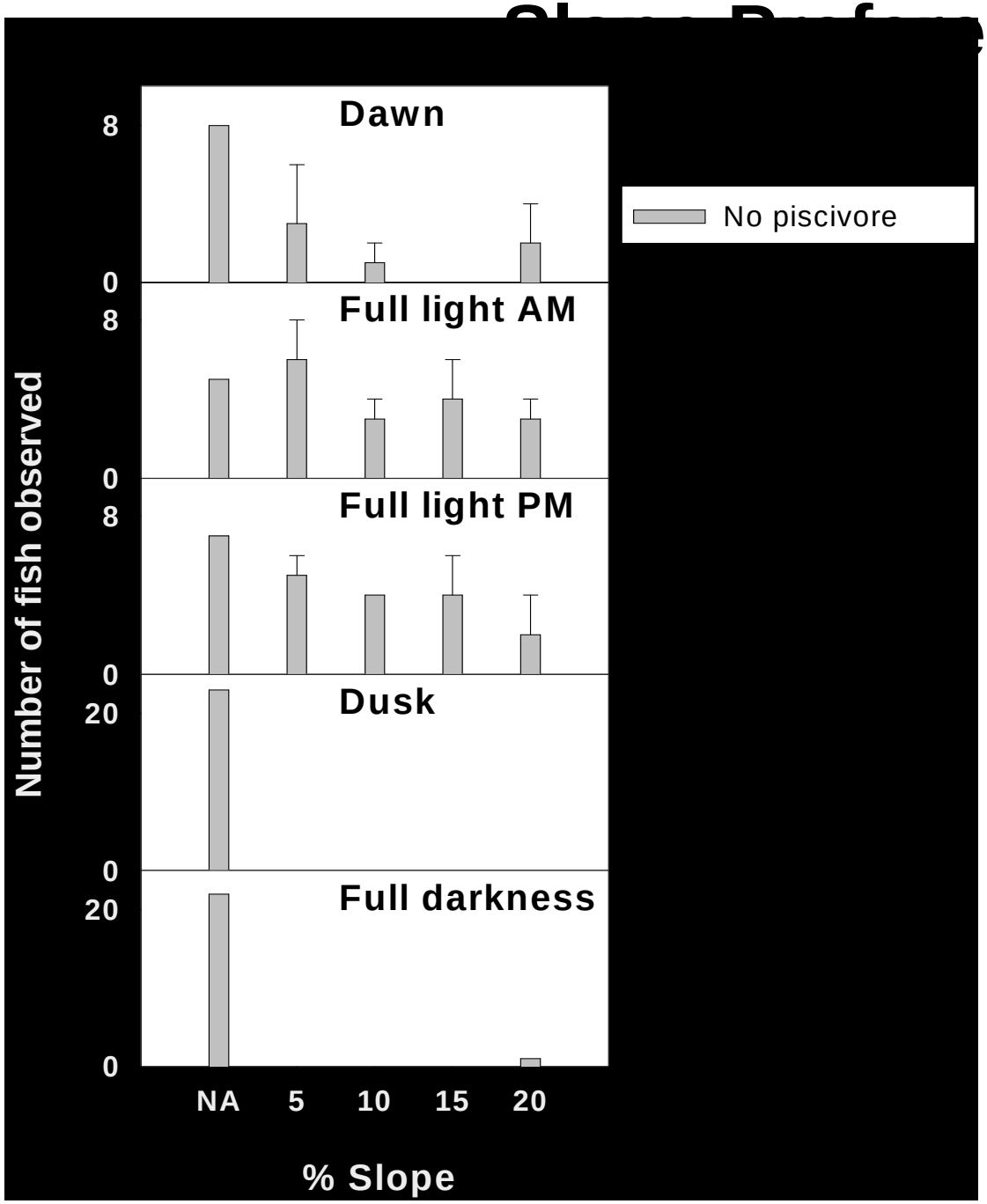
Fish source: Issaquah Creek Hatchery

Dates	Arena configuration	Piscivore present?	Naïve or experienced fish?
21-22 May	5, 10, 15, 20% slopes Sand only	No	Naïve
29-30 May	5, 10, 15, 20% slopes Sand only	CT and SMB	Experienced
5-6 June	5, 20% slopes Sand and cobble	No	Naive

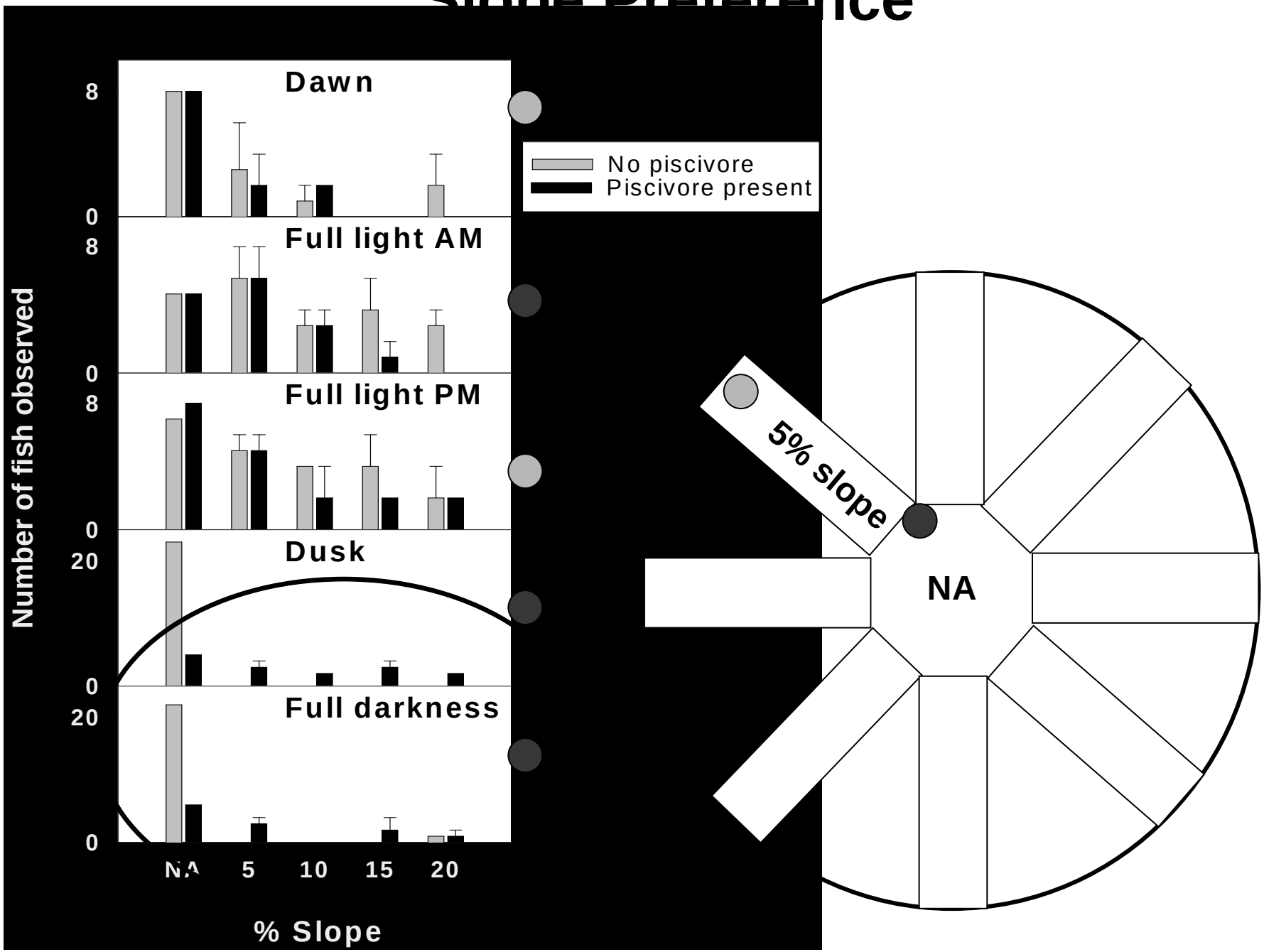
Experimental protocol

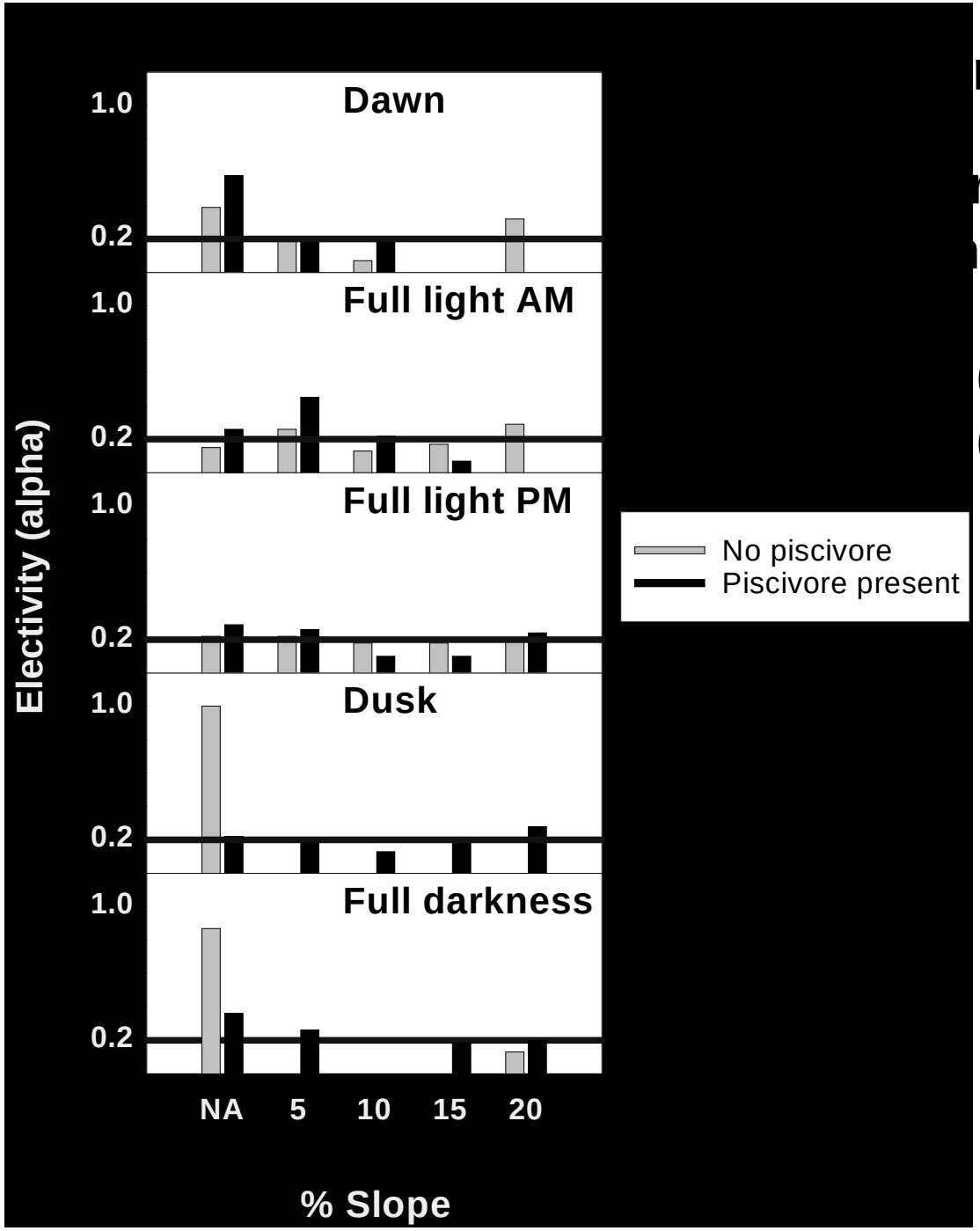
- **24 fish per trial**
- **Acclimation period: 24 hours**
- **Observation trials: Approx. 8 minutes**
  - **Dawn**
  - **Full light AM**
  - **Full light PM**
  - **Dusk**
  - **Full Darkness**
- **Data taken**
  - **Individual habitat choice**
  - **Location within habitat unit**
  - **Depth**

Slope Preference



Slope Preference

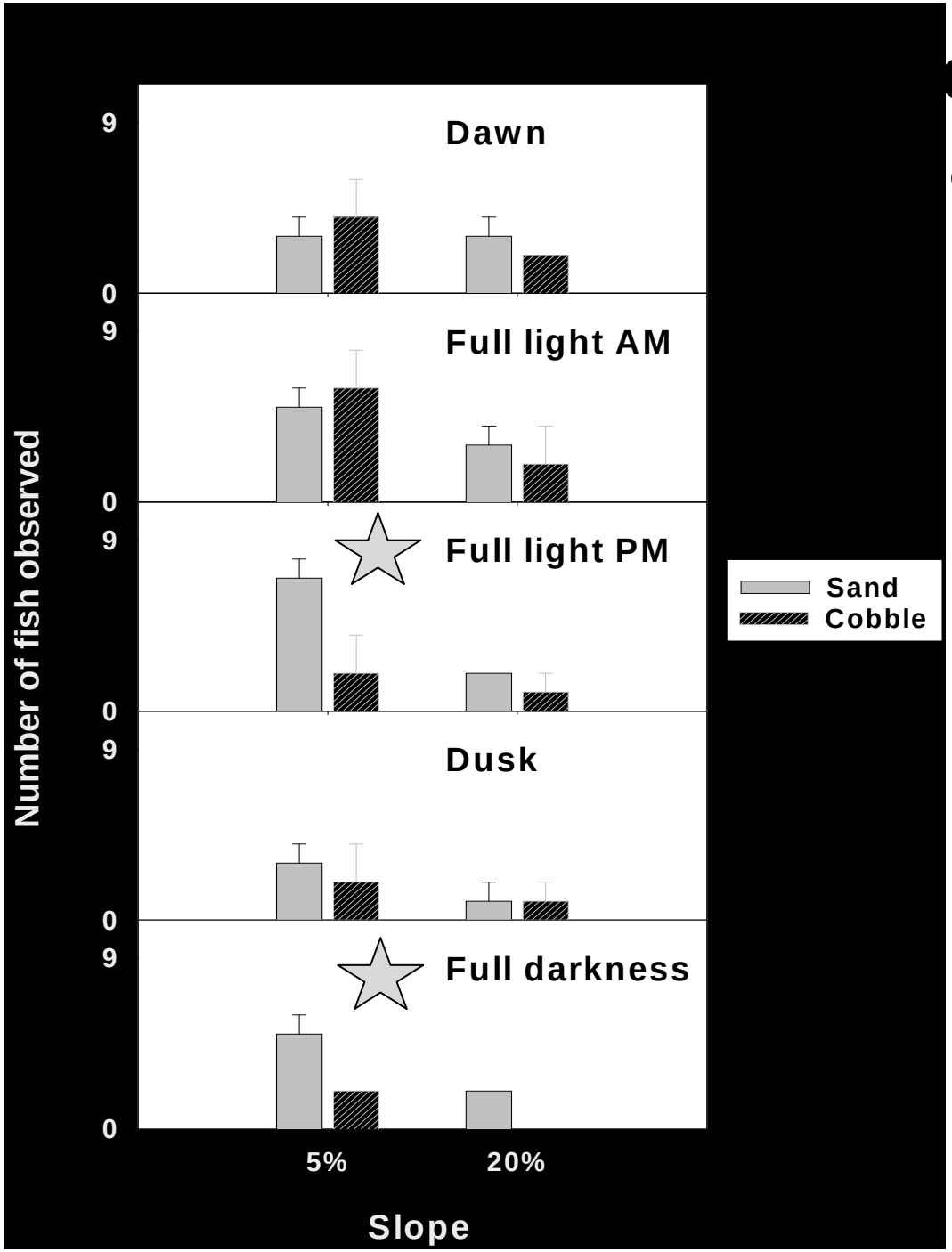




ndex: Chesson's Alpha

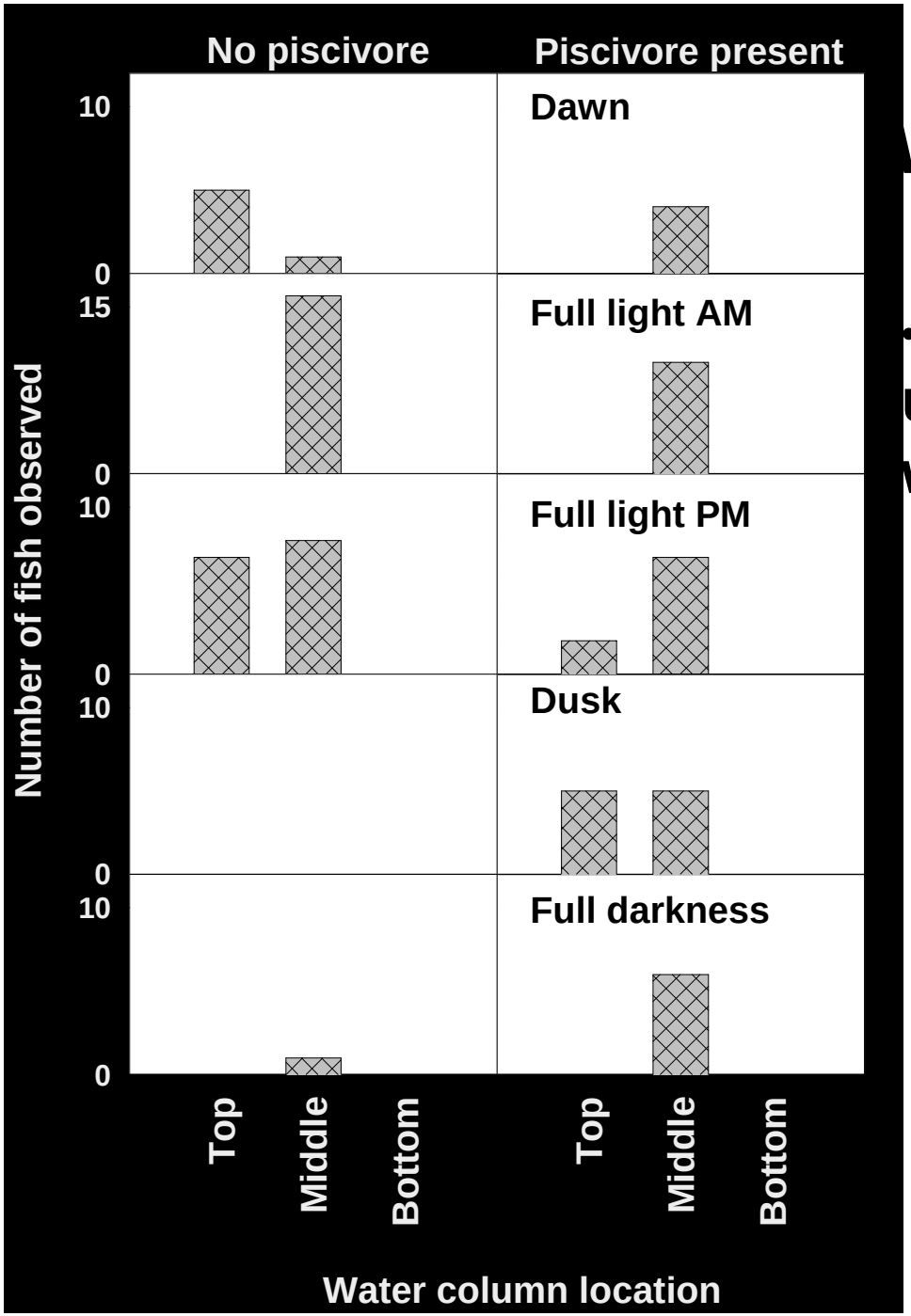
reference based on
habitat available

0.2 = preference
0.2 = avoidance



ction between slope and substrate

- 2 periods with significant preference for low slope habitat
- No significant substrate preference



Water column location

- Juvenile chinook tend to use upper portions of the water column

Pilot study conclusions

- **Fish move to deeper water at night (neutral zone), but this movement is less apparent in the presence of piscivores**

- **Slope choice appears random, but there may be some preference for low slope**

- **Fish are mainly using top portion of water column**

- **Caveats**
  - **Only one size class**
  - **Low sample size**

2004 experimental plans

- **UW Hatchery**
  - **Slope**
  - **Slope and substrate**
  - **Shoreline type**

- **USGS @ Sand Point**
  - **Substrate**
  - **Cover (docks, woody debris)**
  - **Shoreline type**

Repeat for three life stages: Fry, parr, smolts

Acknowledgements

- **Committee: Dave Beauchamp, Tom Quinn, Roger Tabor**
- **Seattle Public Utilities: Julie Hall, Keith Kurko**
- **Washington Department of Fish and Wildlife: Issaquah hatchery**
- **Beauchamp group**
- **Reno the Dog**